

VISIT...

LANZAROTE
Caliente.COM

TRANSHUMANISM IN HIGHER EDUCATION: SOCIAL IMPLICATIONS AND INSTITUTIONAL ROLES

MICHAEL C. THOMAS

Purpose

Following is a body of work intending to highlight societal changes and implications therein for institutions of higher education, which may stem from the research, development, and integration of advancing digital technologies into the human body and mind. Concepts such as transhumanism and the technological singularity will be studied in the context of the human social reality in order to gain perspective on this relationship's significance in present time as well as indications for the future. Not only do implications of great transformation in socially developed nations exist, but there are profound possibilities for the treatment or eradication of disease, famine, and overpopulation in the underdeveloped world. Interdisciplinary research--within the following fields: genetics, genomics, nanotechnology, biotechnology, gerontology, supercomputing, transhumanism, behavioral sciences, applied ethics, and politics among others--will not only provide a glimpse into a world very different from the one in which we currently live, but will allow humans to begin safely designing their social futures and redesigning themselves physically, mentally, and spiritually.

Literature Review

Human beings currently use devices, such as remote controls, keyboards, mice, touch screens, headphones, mobile devices, tablets, programs, and lately even vocal recognition software to interface with machines. Interaction between man and machine is going to continue to evolve and change as will man's merger with these technologies. (Kenyon, 2008) Transhumanism is a term used by those working and studying in fields of technological evolution to refer to a theoretical evolutionary shift in which human beings augment their reality through technological enhancements to the body and mind. A singularity in astrophysics refers to the event horizon of a black hole at which point nothing can escape its gravitational pull. (Zimmerman, 2008) Borrowing from theoretical physicists, technological researchers coined the term singularity to refer to the point in the future in which human beings engineer a superintelligent machine or race of machines that have the capability to surpass the intellectual capacity of unenhanced biological human beings. Currently, it is impossible to determine the outcome of such an event, thus the nomenclature. Studying these two concepts from a sociological perspective will offer humanity some insight into the possible effects such theoretical implications may have on educational institutions and the social world in general. Interdisciplinary and multidisciplinary research such as this will offer a valuable perspective tool in preparing for what may be a dramatic social, cultural, and evolutionary transition in the human experience.

Universities and colleges are already experiencing the effects of the expanding digital learning platform. In a study conducted by Allen and Seaman (2013), the percentage of students enrolled in, at least, one online course in a degree-granting postsecondary institution

rose from 9.6% in Fall 2002 to 32.0% in Fall 2011. (Allen & Seaman, 2013) Comparing this and other data with the emergence of Massive Open Online Courseware (MOOCs) and Small Private Online Courses (SPOCs), there has been a great push in refining systems intending to teach students online. A seemingly incomprehensible supply of knowledge currently exists on the Internet for any eager student to find; however, therein lies the greatest struggle. Students who are eager to learn must search for this knowledge if pursuing it independently, whereas educational institutions not only afford condensed specialized curricula, but access to faculty and other students, which creates a social learning experience. Support and direction are what most traditional institutions are founded on, simply based on the model of degree structure.

According to MIT Chancellor Eric L. Grimson, students are becoming less interested in studying a specific discipline and are increasingly seeking to address specific problems. (Grimson, 2014) Independent research firms, educational institutions, entrepreneurs, startups, and even individuals are taking part in a tech explosion. Some are getting involved simply for financial benefit and some with the goal of somehow enhancing human life. Some are interested in addressing human enhancement for those with physical, cognitive or health disabilities in order to make their lives more “normal.” Some are concerned with solving societal problems like poverty, hunger, clean water, etc. Others are interested in addressing human enhancement for those who are “normal,” but wish to further expand their abilities and the abilities of the machines with which they are becoming increasingly intertwined. Intentions such as these are responsible for generating breakthrough technologies that will soon offer mankind scientific possibilities that were once considered to be science fiction.

Often those studying the technological singularity or singularity refer to Moore’s Law, which when posed by Gordon Moore in 1965 originally referred to the number of transistors per computer chip doubling every 18 months, but has recently been used to refer to the doubling of computational power of hardware every 12-18 months. Exponential growth models such as Ray Kurzweil’s theory, the law of accelerating returns, stem from this premise. (Kurzweil, 2006) The law of accelerating returns claims that not only does computational capacity double, but price performance reduces by half approximately every 12 months, meaning that not only does hardware get faster, but devices are getting exponentially smaller and less expensive. Genetic sequencing, robotics, nanotechnology, and biotechnology are examples of fields that have benefitted or have a great chance of benefitting from just such measurement models. Most commonly, those projecting futurist arguments in support of the singularity use measurement tools like this. If cyber technologies advance at such an exponential rate, a singularity could be achieved by the year 2050. (Kurzweil, 2006) However, through the arduous journey in this direction there are examples to support the claim that humans have begun and will continue to augment their realities with digital technology, becoming increasingly transhuman.

Intelligence, healthcare, and interfacing will be augmented in a future in which Samuel H. Kenyon (2008) suggests we prepare for, rather than be concerned about. Concerns for wiring educational and business institutions for power and data have begun to wither with the advent of wireless connectivity and increasing battery efficiency for electronic devices. Humans currently have rudimentary capabilities to connect to one another instantaneously via mobile devices, which the majority of the developed world now

has access to. People are linked on social networks keeping themselves in communication with friends, colleagues, social groups, and other organizations around the world. A natural tendency in recent years is to make this type of communication more hands-free with the advent of vocal recognition software and products like Google Glass and other wearables. Transhuman beings may soon have the capability to connect themselves (via the brain) wirelessly to the World Wide Web and other networks, providing near instant transferences of information globally. Implications for wireless brain connections may mean that two individuals could share emotions, and groups could share ideologies and meaning without the inefficiency of using spoken or written language, creating the potential for the entire transhuman race to link wirelessly, creating a super being. Possibilities begin to unravel when professionals speak of their breakthroughs in quantum computing, brain mapping, robotics, etc.

Finding a suitable definition for the term enhancement is a truly elusive feat in the context of transhumanism. A word such as this can be used in numerous ways; however, Michael Bess makes the point that all technology is inherently a tool to enhance human capabilities whether they were previously lacking, nonexistent in the species or going above and beyond current capacity. (Bess, 2010) Using the term enhancement should be done wisely in order to maintain integrity and clarity within the context it is being used. Major debates ensue over the definition of when a person is considered enhanced versus unenhanced. One could argue that enhancement begins in utero with prenatal vitamins and supplements to keep the fetus healthy. Performance-enhancing drugs are a good example of currently available substrates used to push a person beyond their current capacity. Subtle as the definition becomes, enhancement is best viewed from the eye of the beholder. A deaf person with a cochlear implant may not be considered an enhanced human to others, but to that person, quality of life may have taken on a whole new meaning. Exemplifying the idea of providing a human capability that was previously lacking, this trait may be taken for granted by some while being paid a great deal for by others. Twenty years from now, a deaf person may receive an implant that allows them to hear ultrasonic sound waves from miles away or automatically translate foreign languages when spoken to. Until a time when enhancements are more discernible like this, cautious use of the term should be applied when speaking of direct technological influence. Educational institutions--both brick and mortar and online--will continue to enhance the learning experience via emerging technologies, physical and virtual environments, instructional methods, etc. By using enhancement technologies, man can prepare himself to become a part of a cyber tech future, potentially saving himself from annihilation by superintelligent post singularity computer descendants.

“Upgrade” can successfully be used synonymously with the term enhancement within this context. Typically used to refer to the act of improving the functionality of machinery or equipment, the fact that people are now assimilating and surrounding themselves with digital machinery means they are essentially upgrading themselves and their environments. Many educators and academic faculty, among others, are proposing upgrades to our educational system that relate to the dramatic technological change currently underway. Watson and Watson (2013) advocate a systemic change in which higher education would undergo a sweeping redesign rather than try and fix a system that was never designed to address the challenges currently faced. Decreasing necessity for students to physically sit in a classroom facing a lecturing teacher means the possibility of decentralization, ease of

accessibility, and improved methods for organizing and presenting curricula. Paradigm shifts necessary to reinvent higher education may include a move away from a traditional closed ivory tower to a more collaborative effort with the external community. Perhaps most profound is the assertion that a successful university of the future will shift from an organization for learning to a learning organization. (Watson & Watson, 2013) A broad shift in what has been ingrained in our culture for thousands of years seems a bit daunting, yet mankind has proven resilient and inventive when faced with grand challenges.

Utilization of fire and the invention of the wheel are considered technological breakthroughs in the evolutionary history of Homo sapiens. Clothing was developed to keep early humans warm in colder environments. Shoes were created to keep feet safe and allow the wearer to maneuver quickly and more efficiently over abrasive terrain. Spoken word was developed as a way to cooperate with others to better hunt, gather, and warn others of dangers. Written word was developed in order to pass along ideas more clearly across great distances and to descendants. School was developed as an organized institution designed to pass along knowledge to the next generation. It is the human brain that has created each of these technologies as survival mechanisms and for advancement purposes. Medicine has been developed from primitive topical alleviations to advanced cyber diagnosis aides, synthetic pharmaceuticals, and genetic therapy. Thirty-seven years was the approximate average life expectancy in 1800, which we have improved upon through technological advancement (largely medical) in order to reach the late seventies today. (Kurzweil, 2006) Continuously, years are being added to the end of the human life, and, at some point, researchers may get to a point in which one year is being added to the end of a person's life annually, thus reaching a longevity escape velocity. (De Grey, 2007)

People in the near future may be able to buy themselves enough time to see a new breakthrough in anti-aging technologies. When that technology begins to deteriorate and its host withers, a new technology may emerge to extend life even further. Aubrey De Grey's longevity escape velocity is based on this principle. Public and political support in the form of acceptance, awareness and funding has fallen, according to De Grey (2007), despite certain breakthroughs and diligent work of his colleagues in the field of gerontology (including, but not limited to, life extension technology research). Biogerontologists have a duty to uphold their commitment to the general public to work on solving humanity's greatest "scourge," aging. (De Grey, 2007)

Overpopulation has been a common thread among inquisitive debaters of longevity. If people were to stop dying of natural causes, the world would conceivably overflow with humans in no time at all. Popular arguments against this are numerous, though none have proven to dispel the observation.

Underdeveloped nations are currently witnessing overpopulation due to mothers having more children than necessary due to lack of awareness, contraception, and high infant mortality rates. Parents want to see, at least, one of their children grow up healthy enough to take care of them in their elder years, thus they overcompensate by having more than enough children to fulfill this desire. With future technologies, parents in these areas could be provided the comfort of knowing that medical diagnoses and healthy treatments are a click away, both available and affordable at which point having fewer children becomes more practical.

Disease and age-related deaths accounted for about 2.3 of 2.4 million American deaths in 2010. (Murphy, 2013) Murder, suicide, and accidental deaths are the remainder. If those 2.3 million people were still alive today, it seems like it would be a huge burden on the world economically, spatially, etc. But consider the possibility that, if people were no longer aging, they could have children when they wanted or not at all. Pressure to have children in one's twenties for time sake would be a thing of the past. Insensitive as it may sound, there would essentially be less turnover, conceivably resulting in fewer people enduring longer lifespans. People could choose to die on their own terms with dignity and grace at whatever age and manner they deem appropriate. Death with dignity has recently become a popular topic among bioethicists and the mainstream in general. Immortality gets thrown around haphazardly among newcomers to the field of transhumanism and more specifically life extension. True immortality is simply unfathomable for the human mind to comprehend, nor is that the suggestion of these researchers. Expansion or extension has become a much more appropriate term within this context. Life expectancy is the desired subject for extension rather than lifespan, as this term tends to indicate a predetermined amount of time.

Mind uploading may provide many people with a substrate for a utopian state in which they could design their own reality online. Call it heaven if one pleases, but more and more people may choose to live on the cloud as it were. Without the bulky physical body, humans would be free to explore a vast array of existential possibilities. Less physical space would be occupied by these individuals. A more comprehensive look at mind uploading is visited below.

Overpopulation is a risk humanity would have to greatly assess from an interdisciplinary approach, but this just goes to show there are counters to the argument. Relinquishing technological progress is not a valid response to such frightening or looming implications; the answer however more likely lies in additional research. Interested parties are socially obligated to participate in enhancement research in order to overcome disease and the human condition. (Glannon, 2008)

Nanotechnology is one of humanity's greatest hopes in the battle against disease and aging. Relationships exist between science and science fiction, between which lies the study of nanotechnology in its ever-growing popularity. (Milburn, 2002) Eric Drexler has pioneered nanotechnological research explaining that engineering nanoscopic machines--often called assemblers or nanobots--will allow people the ability to manipulate their environment by constructing and/or deconstructing physical structures atom by atom. (Drexler, 2005) Implications for the social world are vast. Self-replicating nanobots in a place like modern-day Haiti could potentially disassemble garbage heaps at the atomic level and use those atoms to rebuild chains of carbon structures into food, clothing, shelter, and medicine. Transhuman individuals could create a closed circuit network within their mostly biological body using wireless communication to direct nanobots to search out toxins, dying cells and viruses to eradicate or rehabilitate. Pollution could be controlled through nano-clouds that break down carbon dioxide and repurpose those molecules for more efficient purposes. Harnessing energy and consumption could be completely transformed utilizing nanotechnology.

Concepts such as these are naturally not without their dark cloud. Gray goo is a popular term coined by Eric Drexler and used by many to describe an end of the world scenario in which self-replicating nanobots multiply uncontrollably until they inevitably consume the entire planet for its resources. (Milburn, 2002) Molecular manipulation carries inherent warnings for the necessity of preparation. In order to avoid dystopic and/or apocalyptic outcomes, extended multidisciplinary research should be done in fields such as this rather than recoil from fear of potential risks. Some critics of such technological advancements claim that because there are such dire possibilities, all further progress in these fields should be scaled back or relinquished altogether. (Hughes, 2012) Proponents of such advancement counter by claiming such actions could drive research underground which creates a much more volatile, unpredictable and dangerous environment for this type of market. With support from reliable and responsible institutions of higher education, research can and should be pursued with the intention of recognizing and mitigating potential risk.

Varying approaches to technological advancements can be seen not only among researchers within the field, but even nation-to-nation. The United States has a very different approach to Converging Technologies or CT (Fuller, 2009) than the European Union, for example. Where the US takes a more proactionary approach toward small breakthroughs in nanotechnology, information technologies, genetics, etc., in order to drive innovation within a particular field creating competition and thus an economic boost, the EU takes a more reserved systematic approach, encouraging interdisciplinary or multidisciplinary research in order to provide a more complete picture of the study incorporating benefits and possible ramifications precautiously. (Fuller, 2009) If the two directions continue to diverge, creating more contrast between them, and either or both of these approaches begins to yield greater risk than benefit, it is the responsibility of both parties to intervene in the process and focus on diminishing that risk. For the time being, humankind can only use his means of achieving what is considered to be the most appropriate choice at the time. Science has the potential for both good and evil, but hope ultimately lies in using it to better humanity. (Hughes, 2008)

Economics of an increasingly automated world are both intriguing and concerning. Robotics and robust programs are slowly taking jobs from people in manufacturing, accounting, food service, and education among numerous other industries. By performing dirty, dangerous, and dull or 3D jobs that humans would normally perform, businesses can save money on employee salaries and optimize efficiency by using automated and/or robotic systems. Initially this sparks concern for the individual who may either lose his/her job or is not afforded an opportunity for a job that has become automated. A shift must then take place to reeducate our current workforce as well as those entering the job market. By incorporating these sorts of technical systems into the workplace to do the work that people no longer want humans doing, that theoretically raises the standard for the human workforce. What once required a team of people in a warehouse stocking and shipping now requires mechanical, electrical, and software engineers to develop the machinery to run that warehouse. "Human operators will move between supervision of low-level automation to direct control of complex operations." (Benders, 1995)

In order to educate this new workforce, a robust learning culture must take the place of the collapsing ivory tower learning models in which only the elite acquires a postsecondary education. Arguably this raises another issue of a potential increase in the

wealth gap between those attending higher education institutions in order to stay competitive in the job market and those who are either unwilling or unable to continue such intensive education and training. Solving great transformative problems such as this requires great transformative modes of thinking. According to Benders, (1995) the main objective of creating an automated workforce is to free people from having to perform 3D tasks. Ethically, the obligation is apparent that those citizens actively participating in and benefitting from this transformative automation development must not neglect the rights and needs of the unwilling or unable proletariat. Essentially, the more automation that can be generated, the less grunt-work humans have to do. Similarly, in the context of automating education, Frey (2013) says that when one instructor can teach 50,000 students, it alters the economics of education.

Technoproggressives and Bioliberals are considered to be synonymous terms describing democratic liberal technologists aligning themselves with transhumanist ideals. The Institute for Ethics and Emerging Technologies is an organization of Technoproggressives founded by James Hughes and Nick Bostrom dedicated to being a leader in debates on whether or not governments should play a role in integrating computational technologies into the human body/mind. With the emergence of the Religious Right seen during the George W. Bush presidency, technoproggressives have witnessed a much more conservative opposition to the bioliberal agenda. Apocalyptic catastrophe tends to be the main focus of the conservative viewpoint, and, often times, they promote a drawback of technological progression in order to study the phenomena closer. A major problem with this scenario is who would be responsible for scaling back technological advancement and who should regulate that industry. (Hughes, 2012)

Some on the religious right see the CT (Fuller, 2009) as abominations against God. Modifications are a direct desecration of God's image and thus should be avoided altogether. Groups like the Mormon Transhumanist Association actually take the opposite view explaining that man should strive to be more God-like and thus should embrace enhancements in order to fulfill this ideal. Currently, most transhumanists consider themselves to be secular or atheistic taking a strong standpoint in favor of hard sciences over religion. (Hughes, 2012) Cory Doctorow has gone so far as to claim that the transhumanism could be considered a religion for geeks and that the singularity is a Rapture of the Nerds. (Doctorow, 2012, Stross, 2012) Regardless of which side an individual places him/herself, there is a spiritual element that can be argued within transhumanism.

Defining dignity in the context of the human experience and post-human era is a contention of some anti-transhumanists. Human dignity is not reserved for inanimate objects like a bionic limb or artificial liver; therefore, it does not deserve the same appreciation or value as biological entities especially humans. In the event that full brain scanning, mapping, and uploading are possible as Kurzweil (2006) suggests, individuals could make backups of their memories, experiences, emotions, etc. Jotterand (2010) explains that if this becomes the norm, there will be no value in what that backup contains. People will take life for granted and live carefree, untroubled by the consequences of their own or others unique life, which may take away the dignity of the technological enhancement. (Jotterand, 2010) Nick Bostrom (Jotterand, 2010) argues the adverse saying that enhancements may come with an enhanced sense of dignity and morality. A creature with a deeper understanding of the universe and an enhanced or upgraded intellect has a higher probability

of relating to emotion. By claiming that a backup of a person's mind could be seen as undignified and without value would be discrediting an individual, which is contradictory to Jotterand's own argument.

Mind uploading is quite the provocative topic and seems to have been gaining more recognition in recent years thanks in part to research studies, popular culture, Hollywood cinema, and the Obama Administration's B.R.A.I.N. (Brain Research through Advancing Innovative Neurotechnologies) Initiative. Kurzweil (2006) explains that specially programmed nanobots could enter an individual's blood vessels, travel to the brain, scan the neural synapses sending the information wirelessly to a hard drive and thus creating a backup copy of the mind in that moment in time. (Fuller, 2012) Should a tragedy strike and one's biological body be destroyed in a car accident, the last backup copy of their mind could be downloaded to a new biologically cloned body, a synthetic or prosthetic body, or possibly even to a network in which that mind could be fully functioning, learning and interacting with others strictly on a digital platform with no body to speak of.

Whether this sounds like science fiction, the plot of a nightmarish horror movie or the path to a utopian existence, it is a reality being discussed by prominent academicians, technologists and interdisciplinarians. Identifying peoples goals and desires by their actions rather than their words often shows that past a certain point, people are willing to forgo personal security for the freedom (and risk) of exploring possible alternative existences. (Fuller, 2012) For the most part we are an exploratory species often times at the expense of the natural resources and adjacent animal species. By this token, there is no perceivable reason mankind would suddenly develop a conservative approach to expanding his own existence. An intelligence explosion is what is at stake and at no time in history has intelligence been viewed as a detriment to our culture, unless it is the intelligence of our enemies. Moral enhancement is a trait to be strongly considered when studying upgrading cognitive abilities. If possibilities exist to reason with what would once be considered an "enemy" in a diplomatic digital format in order to extinguish violent opposition, this should be fervently explored.

Educational institutions may have to consider modes of teaching for various stages of human capacity as well. A human with a specialized brain implant could conceivably retain more knowledge at a faster rate than a student with no cognitive modification to speak of. Obligation lies on behalf of institutions interested in maintaining a stake in future learning environments to develop models to address these possible scenarios. Should man merge with cyber technology prior to birthing an autonomous intelligent machine then there is little perceivable threat of us versus them, in this case we are them.

Soft Takeoff Scenario:

In the event of gradual bio-technological integration there will be inevitable social changes that will arise within micro and macro social relationships. Human beings will adapt available and affordable technologies as part of their cultural lifestyle, steadily inching forward with the expansion of technological development. As cyber technology expands, so do human beings, eventually spawning what may be considered a new evolutionary species from human to transhuman, or to use a more pop culture term cyborg (cybernetic organism). Intelligence Amplification or IA is a residual side effect of an enhanced human

who has a technologically expanded intellectual capacity as well as harmonious access to knowledge via the cloud. (Vinge, 2008)

Hard Takeoff Scenario:

In the event of an “awakened” machine, commonly referred to as an Artificial General Intelligence or AGI, people would face new platforms for social interaction between man and machine as well as new social order among man and among machines. If IBM were to call a press conference tomorrow to tell the world they had given birth to an autonomous thinking machine, that machine, with access to a large enough database of knowledge like the internet, would quickly surpass the human intellect and may have its own agenda be it positive, neutral or negative for human kind. A new social order would quickly come to pass as the new superintelligence suddenly dethrones Homo sapiens as the smartest living being on the planet. People would naturally react as they commonly do with confrontation or worship, at both extremes. Super-intelligent machines would most likely rapidly design smaller, faster, smarter, more efficient successors repeatedly within a short time frame. One day, computers will be as smart as humans, but only briefly. (Vinge, 2008)

Study of the Subject

Many prominent technologists study the implications of the research being done within their fields. Highly credentialed and public figures like Ray Kurzweil have spent careers developing technological interfaces, reporting on such progress and making projections for the future. Also, there seems to be a growing trend for researchers in the soft sciences like: ethics, political science, sociology and psychology to study such cyber technologies in order to understand their possible effects on individuals and society. Research organizations, such as the Institute for Ethics and Emerging Technologies or IEET, is just such a group dedicated to studying the social implications of 21st century cyber technologies, ethical issues that may be associated and possible political action necessary for the welfare of individuals and societies through transitional periods and beyond. Experimentation is always a leading indicator of change even if there isn't a clear view of what it will look like on the other side. (Frey, 2013) University promotion of interdisciplinary research will be helpful not only to value individual research projects from different perspectives, but to place the research into context within society. With varying perspectives, there is a higher likelihood of finding lasting values to expand upon and possible detriments to avoid or refine.

Hypotheses

(H1) Emerging digital technology will give way to platforms capable of merging with human physiology, as well as give way to autonomous intelligent machines surpassing the intellectual capacity of unenhanced humans, which will in turn dramatically affect the human social world.

(H0) Digital advancements may continue, but will not soon give way to breakthroughs such as artificial intelligence or techno-biological mergers, therefore human beings will see no radical changes in societal norms due to these cyber technologies.

Key Concepts and Definitions

The following terms being used for this research project may have additional, parallel or contrasting definitions elsewhere. Developing a vocabulary for this research has allotted the researcher general definitions that could be broadly accepted throughout this field. Few definitions are taken directly from sources:

Singularity: The point at which digital technology in the form of autonomous computing advances to and surpasses the limits of the unenhanced human brain. Such intelligence should successfully pass rigorous testing, including but not limited to the widely accepted Turing Test. It is from this point forward that a synthetic intelligence explosion is theorized by researchers like Vinge and Kurzweil to rapidly expand beyond predictable measures.

Transhumanism: A concept referring to merging cyber technologies with the human body and brain in order to expand or enhance human potential. Transhumanists are human individuals who align themselves with these and similar ideals. Transhumanism is commonly recognized among researchers in the field as a transitional period in the theoretical future evolution of Homo sapiens.

Posthumanism: The period at which point there are no longer humans being born without some form of in vitro biotechnological integration or genetic alteration. Another scenario perhaps may be a lack of humans being “born” at all. Instead, there may be a new form of spawning new life digitally, like an artificial womb (Firestone, 1970, Hughes, 2012) that eventually replaces traditional childbirth altogether. Following transhumanism, this is another theoretical stage of future human evolution.

Interdisciplinary: Typically a postsecondary education (college or university) has required students to earn a degree through specialized research, whereas the interdisciplinary approach promotes wider collaboration between departments in order to gain perspective and place research into context.

Multidisciplinary: Similar to interdisciplinary, but rather than the collaboration between departments, it is the student who is freer to explore various departments in order to tailor his own education to his areas of interest.

Nanotechnology: Molecular engineering nano-scale machines (measuring approximately 100 nanometers or less) that can self replicate and carry out tasks that mimic or rival biological viruses in order to combat disease and aging, and reinvent manufacturing techniques among other possibilities.

Biotechnology: Using state-of-the-art biological engineering techniques to manufacture new tissue, or to rebuild or re-grow diseased and/or aging biological tissue for the purpose of reestablishing health in an otherwise unhealthy biological individual. Including genetic engineering, 3Dimensional printing and stem cell research among other fields, this concept often relates closely to nanotechnology.

Longevity, life extension or radical life extension: A concept in which a biological individual can utilize advancing nano or biotechnologies to suppress disease and aging processes within the body for the purpose of extending one's life span beyond its current limitations.

Enhancement: Any sort of technological interface or addition to the human body, brain or output function that affords an individual an advancement or advantage beyond that individual's previously unenhanced state. Upgrade and augmentation are commonly used synonymously with the term enhancement within this context.

Moore's Law: The number of transistors on a computer chip doubles every 18 months (Hughes, 2012). This principle is now widely used as a general advancement principle in the technological fields to show the exponential growth/expansion of cyber tech hardware. Some software models have used similar projection methods, but generally this application is reserved for computational capacity in terms of hardware.

3D: Referring to dirty, dangerous, or dull tasks that robotics (mechanical and digital automation) aims to relieve humans of having to perform.

AGI: An acronym standing for Artificial General Intelligence, which refers to the commonplace notion of machine intelligence or AI/Artificial Intelligence, which displays self-awareness and can rival the human brain in complexity and speed. (Gubrud, 1997) Since developers have begun to use the term AI to refer to learning algorithms now common in many technologies, the term AGI has become more appropriate when speaking of the typical "conscious machine."

Technoprospective: A person or the ideology of aligning with a pro-advancement stance within a liberal political view of technology and transhumanism.

Turing Test: Alan Turing developed a test that could theoretically be the determining factor in whether a machine has reached human level intelligence or not. In order to pass a Turing Test, an intelligent machine would convince a human judge through conversation, of its humanity making itself indistinguishable from a biological human being.

Cyberculture: Social mores and norms of those who use digital technology as a cultural supplement in their everyday lives. This can refer to present human individuals, transhuman individuals, or AGI individuals in the future.

Data Collection

Data collection on the topic of the singularity is qualitative by nature and often infers social contexts. For sociologically specific work, there are historical comparative concepts and theories addressed. Studying advancements in varying fields will be the key to gaining perspective on the singularity. Interdisciplinary or multidisciplinary investigation may be the greatest ally a researcher has in creating transformative progress in theirs and other fields of study. Scholarly journal articles are the primary source of information for this research.

Measurement of the Key Concepts

Singularitarians, technoproggressives, and trans/posthumanists will use constructs, such as enhancement, upgrading, uploading, longevity, extension, genomics, robotics, computation, supercomputing, hybridism, merging, applied ethics, bioethics, artificial intelligence, artificial general intelligence, machine intelligence, interfacing, and many others. Variables within each of these are specific to their field and the context in which they are used. Unlike quantitative research, the measurement of such concepts, constructs, and variables being used for this research are relative, theoretical, relational, and often too subtle to clearly define.

Population Studied

When speaking of the social implications of the singularity, immediately there are two assumed populations: People who partake in a social reality (i.e. contact with others whom also have contact with the outside world and are available to cyber technologies) and those who use digital devices in their everyday lives (these people are more likely to adapt to emerging technologies quicker than those who do not use personal digital devices such as: computers, mobile devices, tablets, etc.). A third group can be recognized as not having direct relation to the social implications of the singularity and they are individuals, groups, tribes, etc. who are removed from “civilized” society and have little to no contact with the digital world. Studying possible implications of future technologies on the social world with a focus on institutions of higher education means researching past and current trends in technology, therefore samples can be drawn from various fields of technological research. For this project, qualitative samples from the following areas are drawn: neurobiology, nanotechnology, biotechnology, supercomputation, gerontology, transhumanist sociology, bioethics, robotics, genomics, and the singularity among others.

Sampling Size and Description

Sampling has not been conducted in the quantitative or qualitative field research sense, but in a historical comparative nature. Journal articles--largely historically comparative in nature--have been gathered in order to acquire relevant data for this project. Authors of these articles study in fields of ethics, education, behavioral sciences, and technological progression. Using these articles in order to collect a broad understanding of the subject from a sociological perspective is the main purpose of gathering such articles. Intention has been set on acquiring sources ranging through various fields of research within a transhumanist context.

Methods of Data Collection

A historical comparative analysis of various trends in technological progression and exponential computational growth is the preferred method of data collection for this type of research. One could argue that certain ethnographic techniques are employed where data has been cited from a field researcher collecting data on his/her or colleagues' research.

Ethical Considerations

Ethical considerations in a research project such as this are not typical of other qualitative sociological ethical issues. Ethical choices are not necessarily being made by the researcher in order to protect the confidentiality of persons being studied as is typical; instead, the ethics being considered are the possible moral obligations and civil rights that should be considered for human, non-human, or hybrid citizens of our social culture. When the time of autonomous thinking machines or enhanced humans arrives, it will be too late to then begin considering human reaction to such entities. The nature of this research suggests that we will give birth to something that surpasses human limitations. Therefore, one can surmise a more complex social order will arise that may no longer adhere to the same ideals as the current human social order (human ethics included).

Desired Results

It is the intention of the researcher to gather preliminary data for a larger, more comprehensive body of work in the field of Sociological Transhumanism. Compiling conceptual definitions and historical comparative analysis on broad topics under the umbrella of the singularity will supply a foundation for specialization in future studies (no pun intended). Greater understanding on how the human race may collectively be affected by such coming events will allow possibilities for critical social science techniques to be employed later on, which could potentially help prepare the audience for such an occurrence. Exploring current debates within this broad field will provide greater understanding of how best to implicate oneself for a humanitarian or better yet transhumanitarian approach. Endorsing positive general welfare should be the underlying motif of the works of all technoproggressives.

Refining a process through internal and external audits is a staple in the world of manufacturing. This concept helps the adopter shed non-value added waste in time and resources creating a more efficient machine. All developing research especially that of behavioral science and technology should support a similar approach to this and embrace multidisciplinary development.

Limitations

Historically comparative in nature, this type of research has the limitation of only being able to accurately study the present and the past. Projections of the future can be narrowed by professionals, from which fairly accurate assumptions may best be inferred from median determinations. If one were to look at the projections of several prominent researchers in a specific field and draw an average assumption for areas in which they all seem to agree, that may be a reasonably accurate depiction of a likely future event. Unfortunately, that lacks the credibility of testing as is so highly touted in the scientific fields.

Time has not only shown to be a constraint for this research, but it may turn out to be a constraint on the subjects of this research as well. Gathering a broad enough understanding of the topic to provide a general foundation with clarity has proven

frustrating. This can be attributed largely to the fact that the topic in question is ironically envisioning a not so distant future in which the rapid and accurate absorption of robust knowledge may soon be a simple click away and yet as of right now, absorbing knowledge is only as efficient as the reader, listener, or interpreter.

Quantitative data is not readily available in the context of the research provided here. Most of the implications of exponential growth rates in information technologies and life extension sound like sciences that may provide charts, graphs, data sets, etc. in order to visually represent their arguments however this has not proven to be the case.

Future

Research like this and others within the field of sociological transhumanism and the future of higher education is an intricate part of creating a foundation in which hard sciences can safely create profound positive breakthroughs in their fields and in social history. When speaking of proactive preparation, the old adage sooner than later seems to be suitable for most general situations. If humanity is preparing to create technologies that could potentially extinguish all of human civilization, it is certainly a good idea to begin the discussion early so as to promote cautious development and hopefully determine a compromise among the left and right, secular, and religious. Though there may not exist a regulatory body presiding over these research fields, there remains a moral obligation for research institutions to provide certain checks and balances among departments and projects simply for the sake of the well being of humanity. Chances are that if a machine is born with superintelligence exceeding that of an unenhanced human being, it will rapidly design its more intelligent, more efficient successor, which will in turn design its successor and so on. Through this process a machine culture could develop and would likely no longer regard the laws and ethics of humanity as applicable. Fortunately, the possibility of merging with this type of technology may just be the escape route for biological humans to survive the singularity.

The Singularity should not be feared, but respected. It would be an event of man's own volition and should therefore be treated with the consideration it deserves. Creating an open dialogue for behavioral and technological scientists, educators, administrators, and even the general public is appropriate and highly useful for such a topic that may soon be more than just theoretical. Foundational interdisciplinary research has not only begun on these young concepts, but has established various sects with debatable topics. Joining the conversation may prove to be fulfilling for specialized researchers. Intention generally does not fall within the field of weaponry or malicious intent for these researchers though there will occasionally be undesirable side effects. Preparing for those occasions is what could ultimately save mankind from disaster.

Transhumanism is not necessarily a new concept, but in recent years has provided new insight into the possible future of humanity. Within a generation, there may exist enhancement tools and techniques that offer a biological human unprecedented abilities, physically, mentally, and possibly even spiritually. Concern should be taken for the safety of not only those involved in current studies, but the theoretical population for which these technologies are intended. Just because the majority of people may be unaware of such trends does not mean those people will not be affected or should not be provided security. Obligation is a strong term to use when speaking of theoretical future intent, but humanity

should care for itself by safely delving into these matters so as to not naively flip the switch of apocalypticism as it were. Moral obligation is not afforded to the weak, Voltaire explains succinctly in the profound adage: With great power comes great responsibility. Continuous progression is paramount so long as it does not provide negative repercussions to others. Let us design our futures and begin redesigning ourselves!

References

Allen, I. E., & Seaman, J. (2013). *Changing Course: Ten Years of Tracking Online Education in the United States*. Sloan Consortium. PO Box 1238, Newburyport, MA 01950.

Benders, J. (1995). Robots: A boon for working man?. *Information & management*, 28(6), 343-350.

Bess, Michael (2010). Enhanced Humans versus “Normal People”: Elusive Definitions. *Journal of Medicine and Philosophy* 35, 641-655.

De Grey, Aubrey D.N.J. (2007). The Natural Biogerontology Portfolio: “Defeating Aging” as a Multi-stage Ultra-grand Challenge. *Annals of the New York Academy of Sciences* 1100, 409–423.

Doctorow, Cory & Stross, Charles (2012). *The Rapture of the Nerds: A tale of the singularity, posthumanity, and awkward social situations*. New York City: Tor Books

Drexler, Eric K. (2005). Productive Nanosystems: the Physics of Molecular Fabrication. *IOP Science* 40(4), 339.

Firestone, Shulamith (1970). *The Dialectic of Sex: The Case for Feminist Revolution*. New York: William Morrow.

Frey, T. (2013). By 2030 Over 50% of Colleges Will Collapse: Part 1. *Journal of Environmental Health*, 76(3), 58-59.

Fuller, Steve (2009). Knowledge Politics and New Converging Technologies: A Social Epistemological Perspective. *Innovation - The European Journal of Social Science Research* 22(1), 7-34.

Fuller, Steve (2012). The Emerging Political Economy of Humanity 2.0. *Innovation - The European Journal of Social Science Research* 25(1), 79-92.

Glannon, Walter (2008). [Review of John Harris *Enhancing Evolution: The Ethical Case for Making Better People*]. *Cambridge Quarterly of Healthcare Ethics* 17(4), 473-476. Available from Cambridge Journals Online:

Grimson, Eric L. (2014, March 26). *Changes in Higher Education with the Advent of Digital Technologies* [Video file]. Retrieved from <http://youtu.be/1Zn9D4innwk>

- Gubrud, M. A. (1997, November). Nanotechnology and International Security. In *Fifth Foresight Conference on Molecular Nanotechnology* (Vol. 1).
- Hughes, James J. (2008). Back To The Future: Contemporary Biopolitics in 1920's British Futurism. *European Molecular Biology Organization* 9, S59-S63.
- Hughes, James J. (2012). The Politics of Transhumanism and the Techno-Millennial Imagination, 1626–2030. *Zygon* 47, 757–776.
- Jotterand, Fabrice (2010). Human Dignity and Transhumanism: Do Anthro-Technological Devices Have Moral Status? *The American Journal of Bioethics* 10(7), 45-52.
- Kenyon, Samuel H. (2008). Would You Still Love Me If I Was A Robot? *Journal of Evolution and Technology* 19(1), 17-27.
- Kurzweil, Ray (2006). Reprogramming Biology. *Scientific American*, 295, 38.
- Milburn, Colin (2002). Nanotechnology in the Age of Posthuman Engineering: Science Fiction as Science. *Configurations: A Journal of Literature, Science and Technology* 10(2), 261-295.
- Murphy, Sherry L., Xu, Jiaquan, & Kochanek, Kenneth D. (2013). Deaths: Final Data for 2010. *National Vital Statistics Reports*, 61(4) Retrieved from http://www.cdc.gov/nchs/data/nvsr/nvsr61/nvsr61_04.pdf
- Vinge, V. (2008). Signs of the Singularity. *Spectrum, IEEE* 45(6), 76-82.
- Watson, W., & Watson, S. (2013). Exploding the Ivory Tower: Systemic Change for Higher Education. *Techtrends: Linking Research & Practice To Improve Learning*, 57(5), 42-46.
- Zimmerman, Michael E. (2008). The Singularity: A Crucial Phase in Divine Self Actualization? *Cosmos and History: The Journal of Natural and Social Philosophy* 4(1-2), 347-370